US009911407B2

(12) **United States Patent**
Tan et al.

(10) **Patent No.: US 9,911,407 B2**
(45) **Date of Patent: Mar. 6, 2018**

(54) **SYSTEM AND METHOD FOR SYNTHESIS OF SPEECH FROM PROVIDED TEXT**

(71) Applicant: **INTERACTIVE INTELLIGENCE GROUP, INC.**, Indianapolis, IN (US)

(72) Inventors: **Yingyi Tan**, Carmel, IN (US); **Aravind Ganapathiraju**, Hyderabad (IN); **Felix Immanuel Wyss**, Zionsville, IN (US)

(73) Assignee: **Interactive Intelligence Group, Inc.**, Indianapolis, IN (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/596,628**

(22) Filed: **Jan. 14, 2015**

(65) **Prior Publication Data**

US 2015/0199956 A1 Jul. 16, 2015

Related U.S. Application Data

(60) Provisional application No. 61/927,152, filed on Jan. 14, 2014.

(51) **Int. Cl.**
G10L 13/00 (2006.01)
G10L 13/08 (2013.01)

(52) **U.S. Cl.**
CPC ***G10L 13/08*** (2013.01)

(58) **Field of Classification Search**
USPC 704/257–275
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

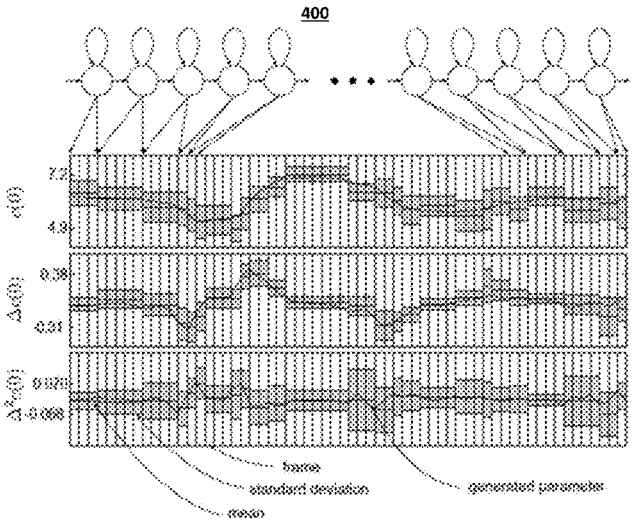
6,014,621 A * 1/2000 Chen G10L 19/0212 704/219
6,961,704 B1 11/2005 Phillips et al.
7,103,548 B2 * 9/2006 Squibbs H04M 1/72547 704/260
7,680,651 B2 * 3/2010 Tammi G10L 19/08 704/219
2002/0120450 A1 * 8/2002 Junqua G10L 13/04 704/258
2002/0193994 A1 * 12/2002 Kibre G10L 13/047 704/260
2003/0028377 A1 * 2/2003 Noyes G10L 13/033 704/258
2003/0163314 A1 8/2003 Junqua
2005/0182629 A1 8/2005 Coorman et al.
(Continued)

OTHER PUBLICATIONS

Toda et al. "A Speech Parameter Generation Algorithm Considering Global Variance for HMM-Based Speech Synthesis". IEICE Trans. Inf. & Syst., vol. E90-D, No. 5 May 2007, pp. 816-824.*
(Continued)

Primary Examiner — Jesse Pullias
(74) *Attorney, Agent, or Firm* — Lewis Roca Rothgerber Christie LLP

(57) **ABSTRACT**

A system and method are presented for the synthesis of speech from provided text. Particularly, the generation of parameters within the system is performed as a continuous approximation in order to mimic the natural flow of speech as opposed to a step-wise approximation of the feature stream. Provided text may be partitioned and parameters generated using a speech model. The generated parameters from the speech model may then be used in a post-processing step to obtain a new set of parameters for application in speech synthesis.

19 Claims, 6 Drawing Sheets